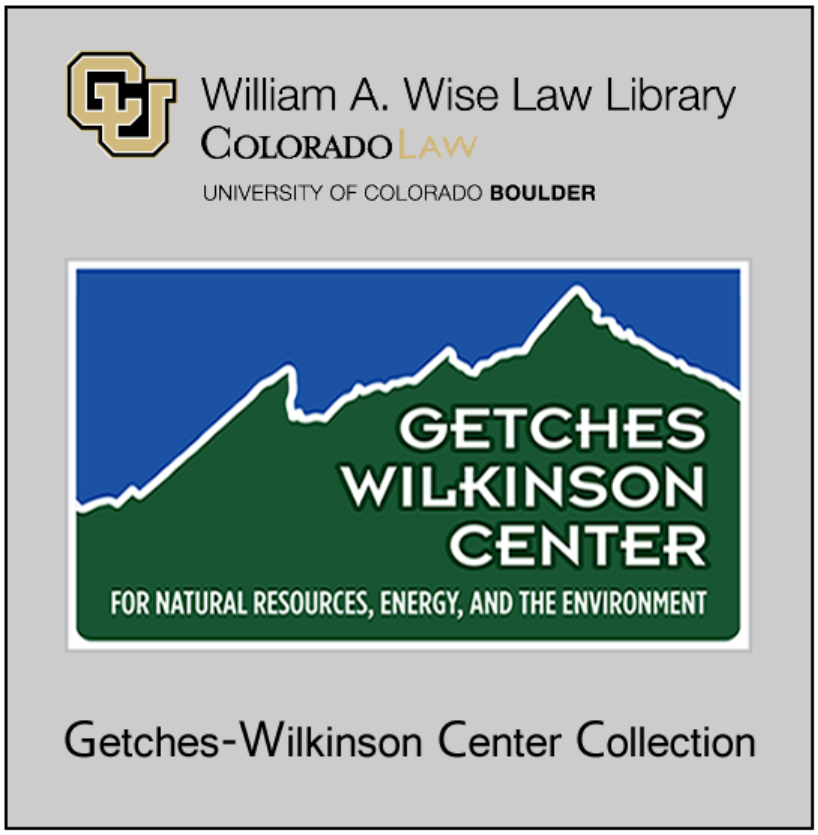
6-18-2004

SLIDES: South Metro Denver Water Supply Study

Patricia Wells



Patricia Wells, *South Metro Denver Water Supply Study*, *in* GROUNDWATER IN THE WEST (Natural Res. Law Ctr., Univ. of Colo. Sch. of Law, 2004).

SOUTH METRO DENVER WATER SUPPLY STUDY

Patricia Wells
General Counsel, Denver Water Board
June 2004

South Metro Denver

11 South Metro Water Providers

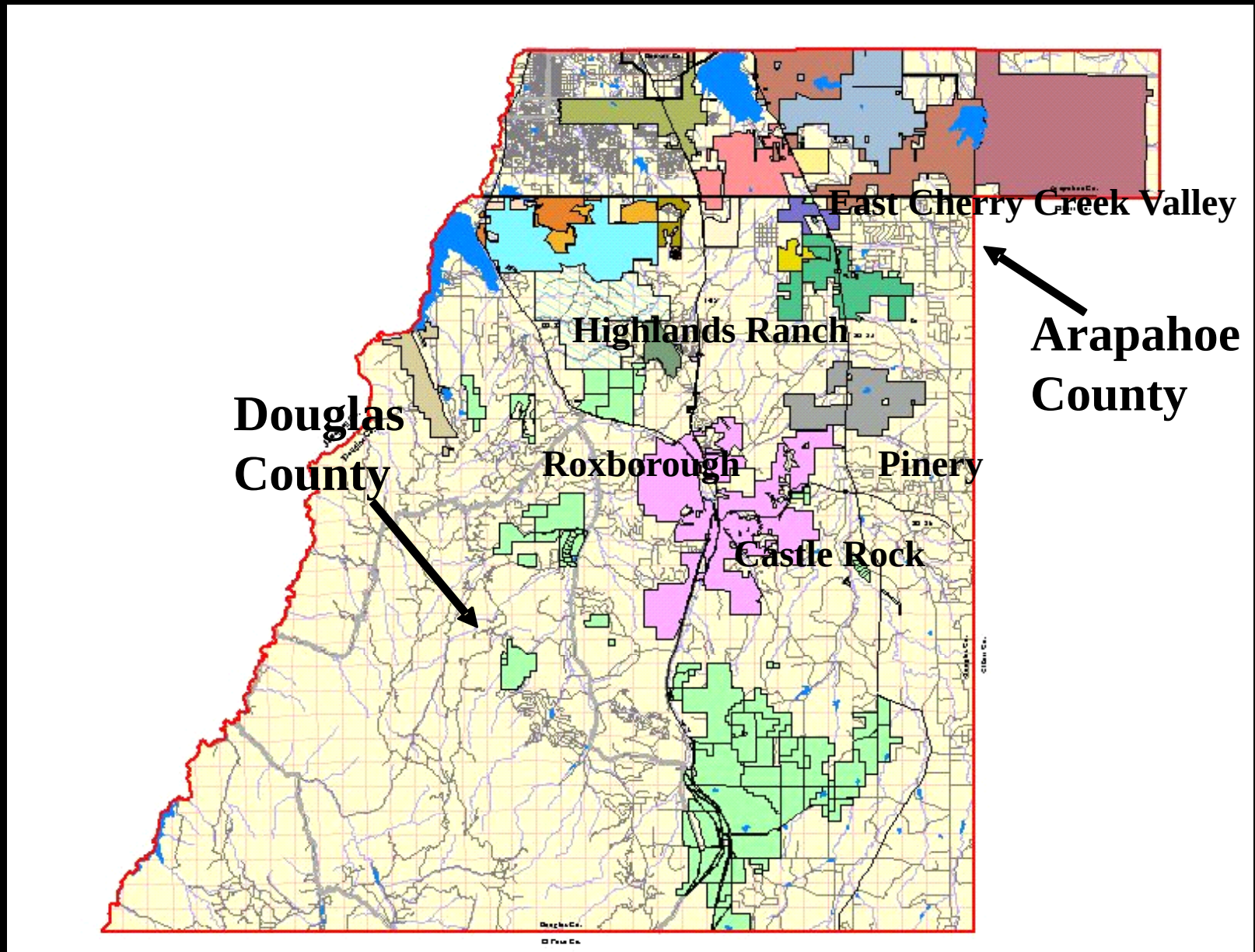
Douglas County

Town of Castle Rock
Centennial Water & Sanitation District (Highlands Ranch)
Meridian Metropolitan District
Southeast Suburban Water & Sanitation District (Pinery)
Roxborough Park Metropolitan District
Stonegate Metropolitan District
Castle Pines North Metropolitan District
Cottonwood Water & Sanitation District

Arapahoe County

Inverness Water & Sanitation District
Arapahoe County Water & Waste Water Authority
East Cherry Creek Valley Water & Sanitation District

South Metro Denver Area



Needs of South Metro Providers

Population

Current	180,000
Year 2025	360,000
Year 2050	410,000

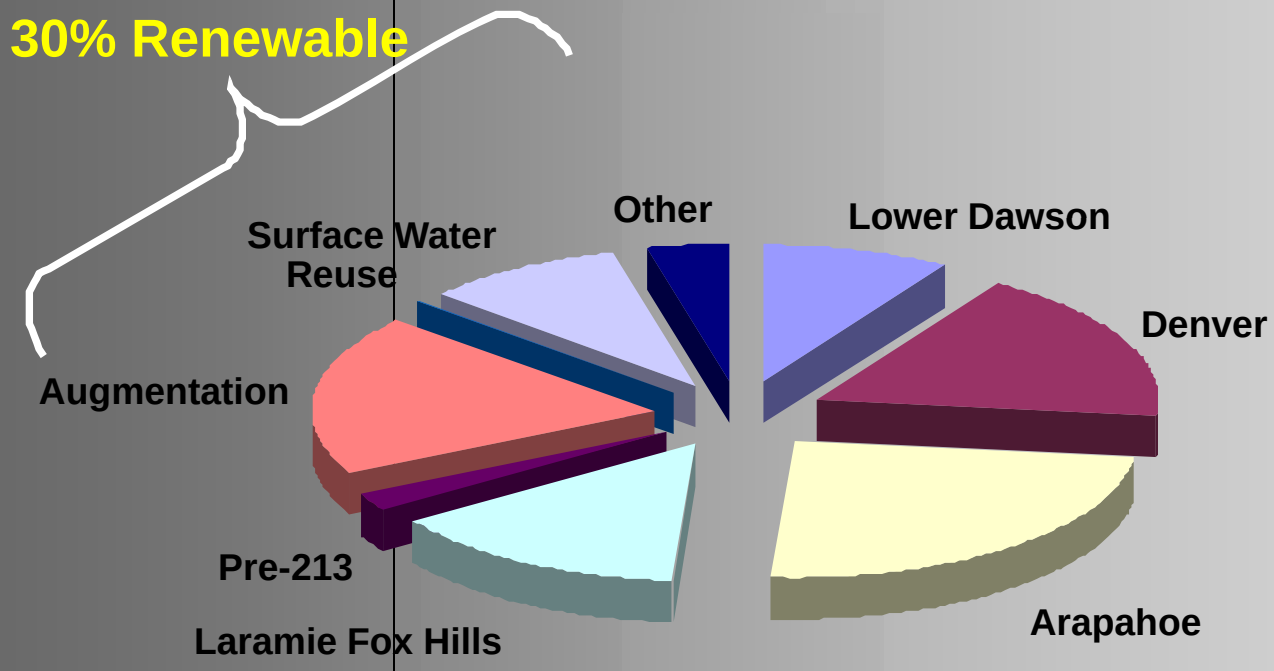
Demand

Current	42,000 af
Year 2020	88,000 af
Year 2050	100,000 af

Supply

70% Ground Water

30% Local Surface Water



70% Nonrenewable Sources

Denver Basin Aquifer

- 460 MAF in storage
- 70 MAF in south metro
- Uneven distribution and recoverability
- Uncertainty about long term aquifer performance
- Limited ability to meet peak demands
- Economic life of aquifer is uncertain, but cost of service will increase over time

South Metro Water Supply Study

Project Initiation 1998

Douglas County Water Authority - Resolution

- Formally requested investigation of cooperative project from Denver Water.
- Incorporated Denver Water's cooperative action guidelines.

Colorado River Water Conservation District and Denver Water Board - Joint Resolution

- Staff to work collaboratively on the Study.
- Explore mitigation for West Slope impacts.

South Metro Concerns

- Water level dropping 30 feet / year.
- Declining water levels greatly reduce well productivity.
- Uncertainty about long term aquifer performance.
- Well-to-well interference reduces productivity and ability to meet peak demands.
- Costs will increase significantly over time.

West Slope Concerns

- Assure adequate water supply for Summit County
- Delay and minimize the importation of water from the West Slope.
- Impact on Summit County economy resulting from fluctuation of Dillon Reservoir water levels.
- Concern that impacts could occur without West Slope influence in the decisions.
- Water quality protection
- Instream flows

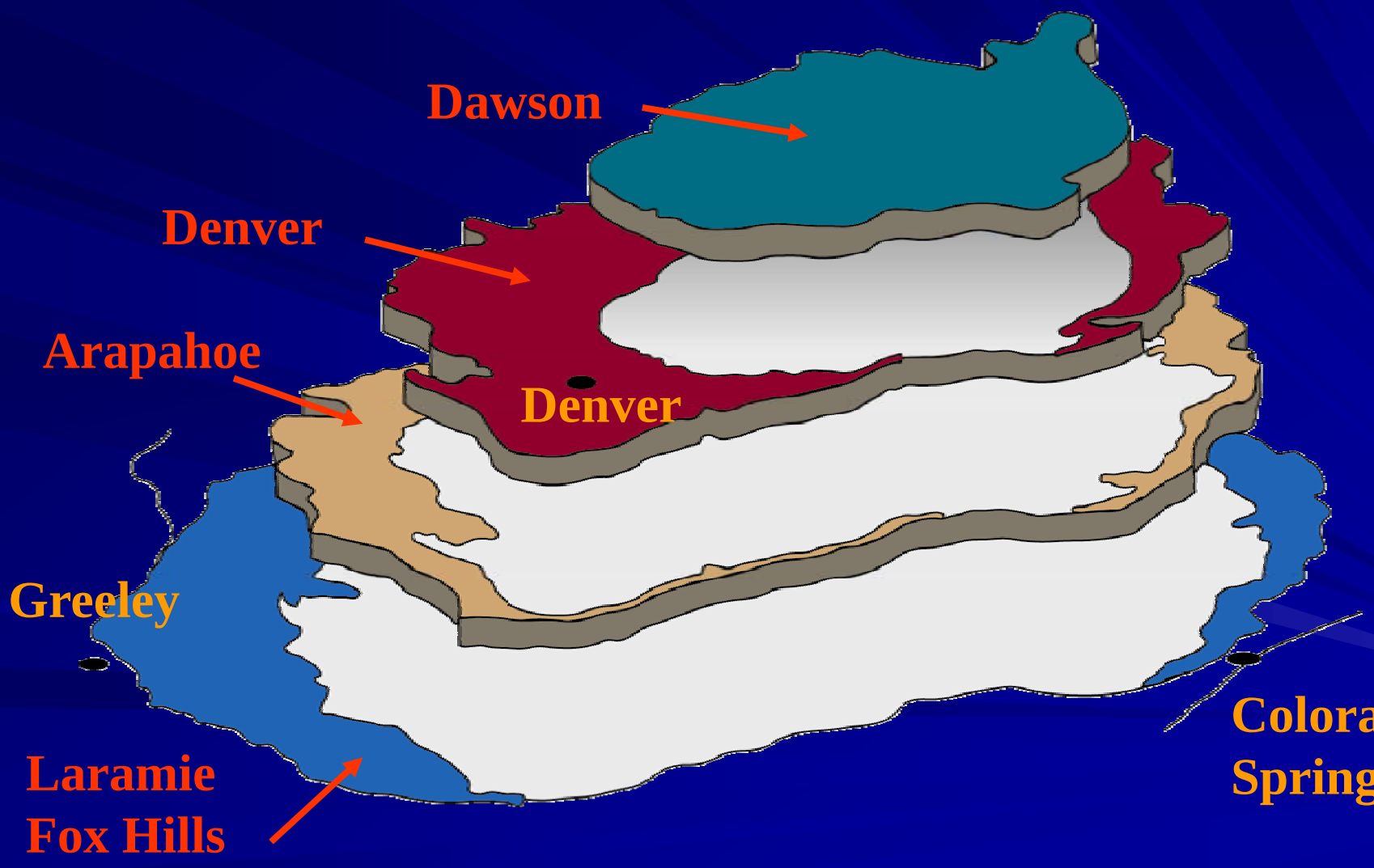
Denver Water Concerns
Guidelines for Cooperative Actions

- Provide significant water and financial benefit to the Board.
- Maximize the use of the Board's existing water rights.
- Minimize the Board's regulatory, financial, legal and political risk.
- Ensure proposing agencies pursue available non-potable reuse and conservation.
- Project sponsor must gain approval from those impacted.

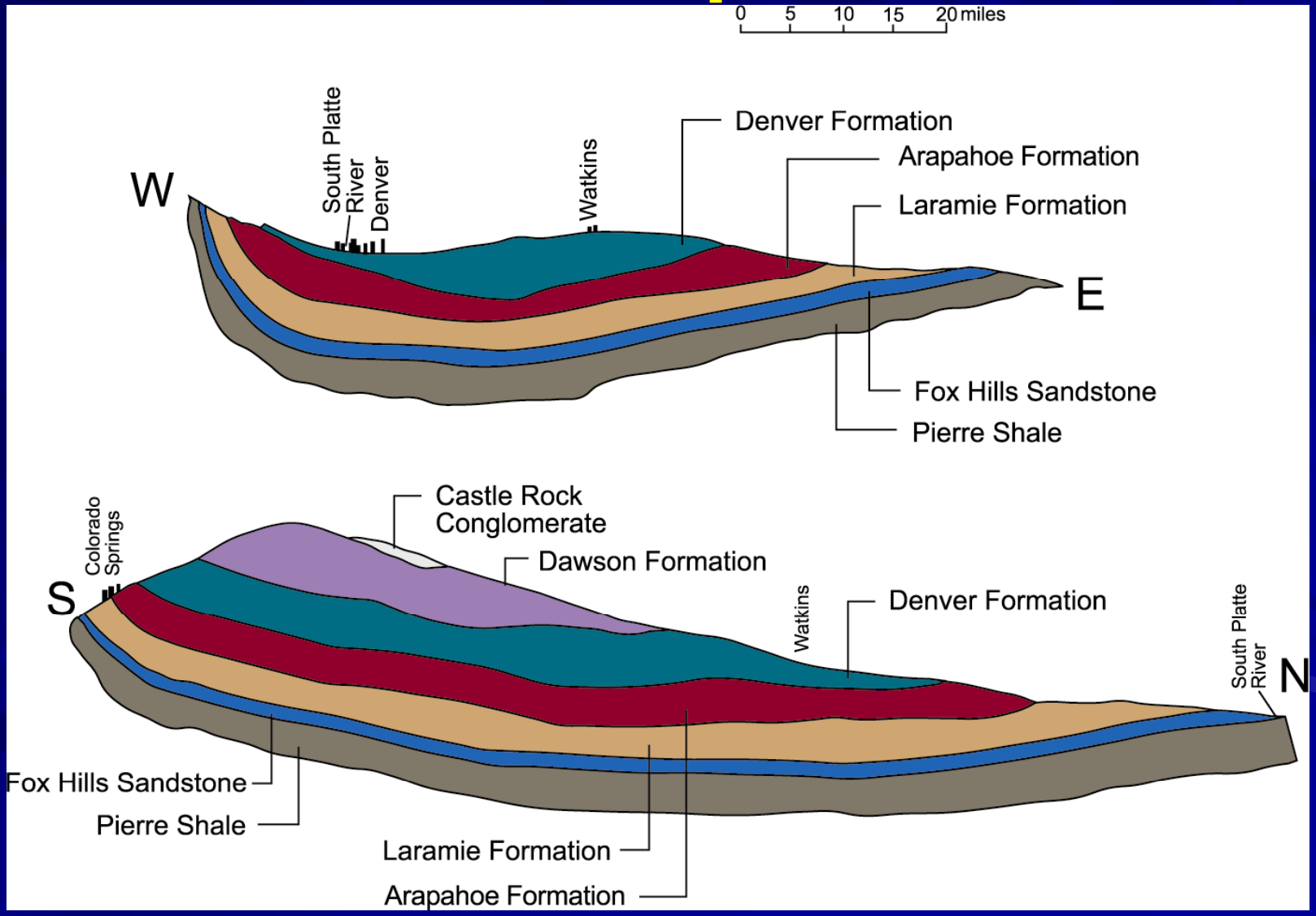
Goals of South Metro Water Supply Study

- Develop a cooperative plan by South Metro Water Districts, Denver Water and Colorado River District
- Maximize use of local water resources, including regional ground water management, conservation and water reuse
- Quantify available local groundwater resources and long term pumping responses in Denver Basin aquifers
- Meet South Metro water demands through 2050

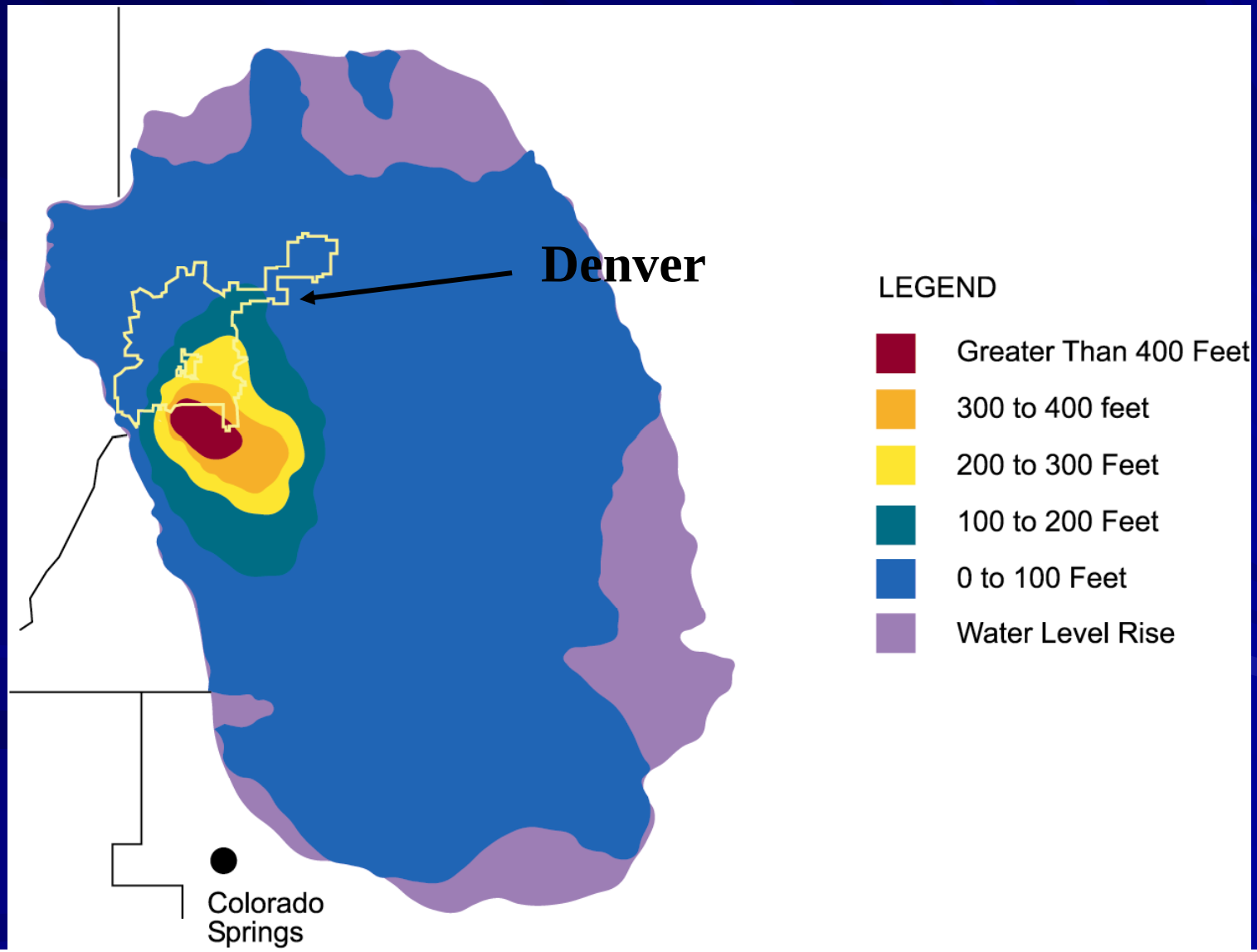
Denver Basin Aquifers



Cross-section of Denver Basin Aquifers

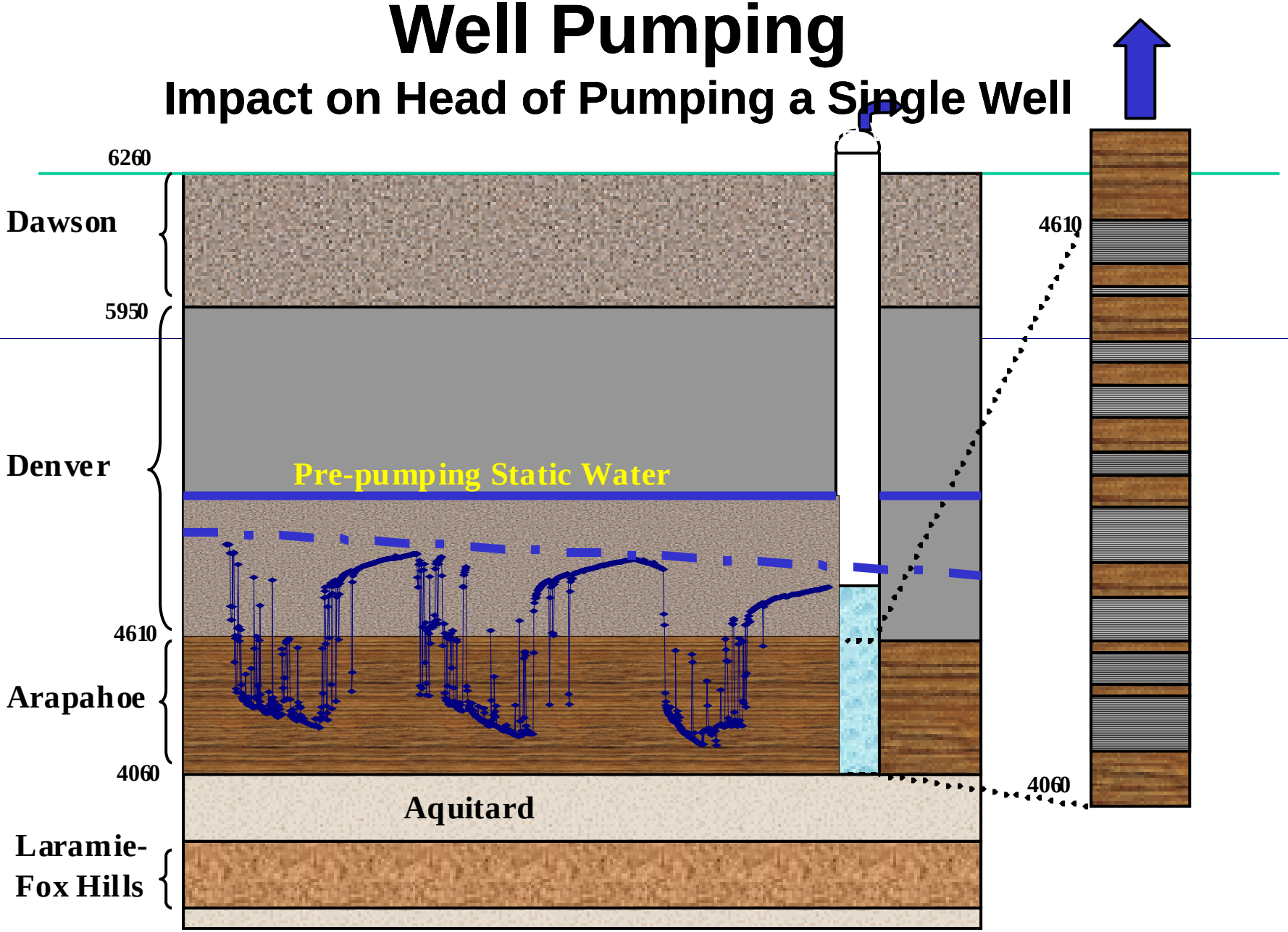


Water Level Changes in Arapahoe Aquifer - 1978 to 1996

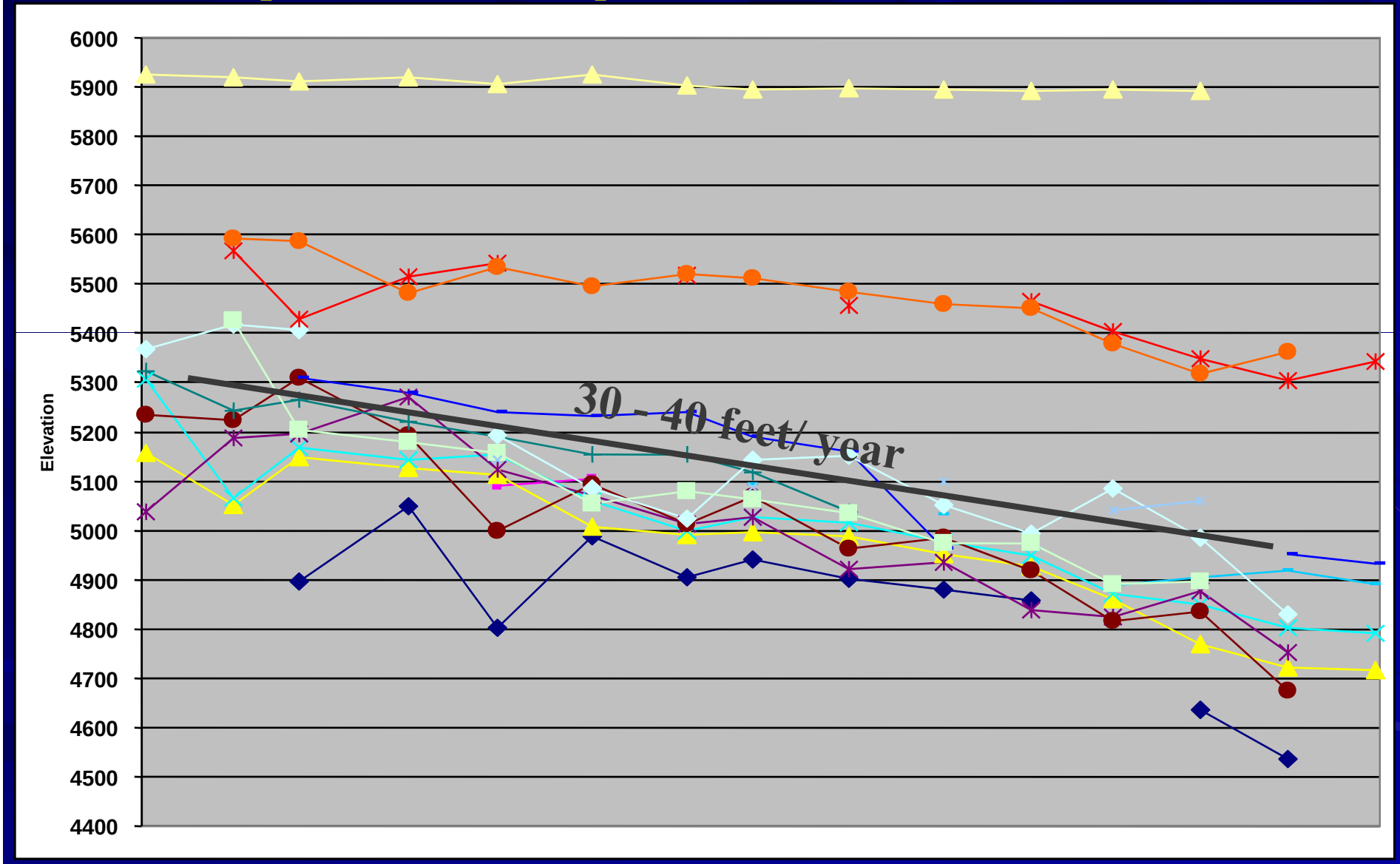


Well Pumping

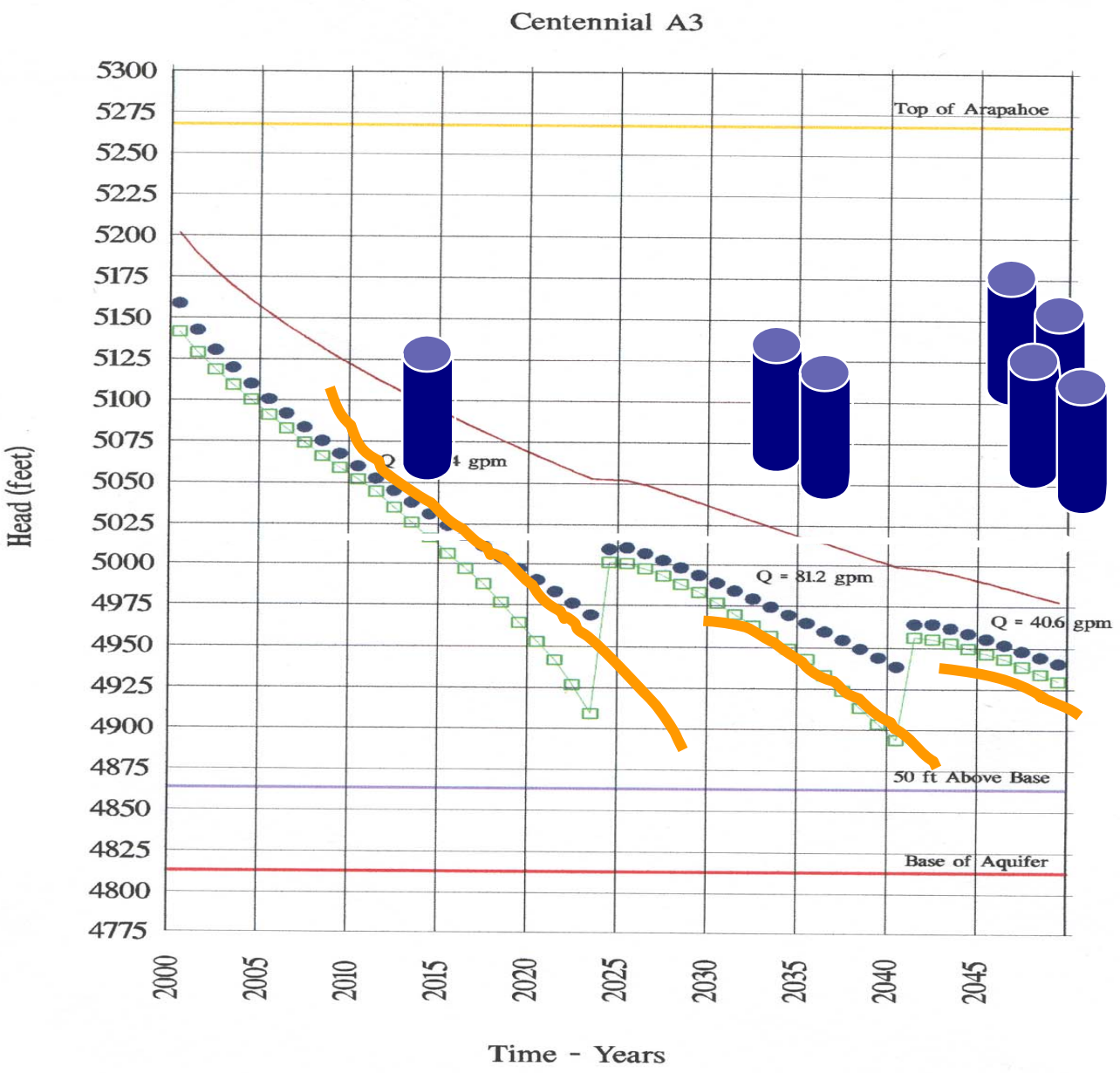
Impact on Head of Pumping a Single Well



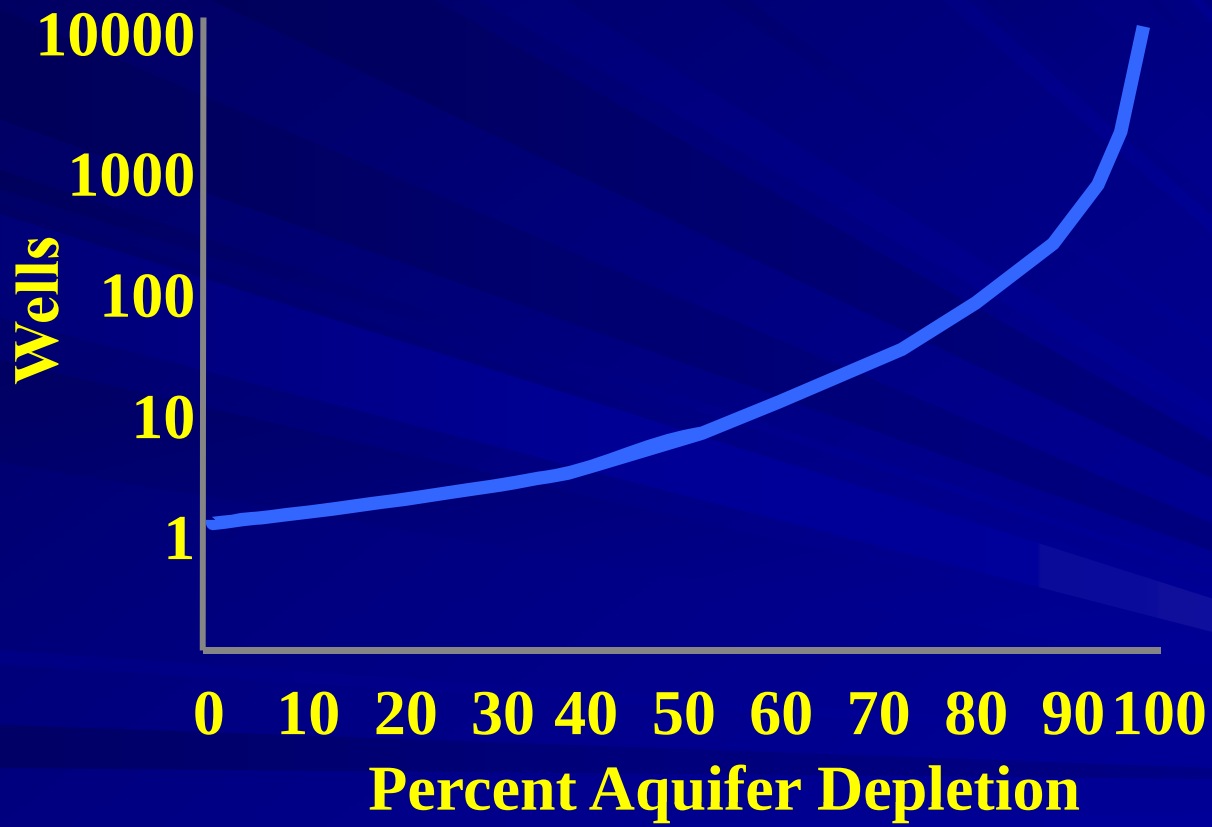
Arapahoe Aquifer Water Levels



The "Doubling Effect"



Increasing Number of Wells as Aquifer is Depleted



South Metro Water Supply Study Alternatives

1A. Continued Development of Denver Basin Aquifer.

1B. Continued Development of Denver Basin Aquifer with Storage for Meeting Peak Demand.

2. Continued Development of Non-tributary Ground Water with Maximum Reuse.

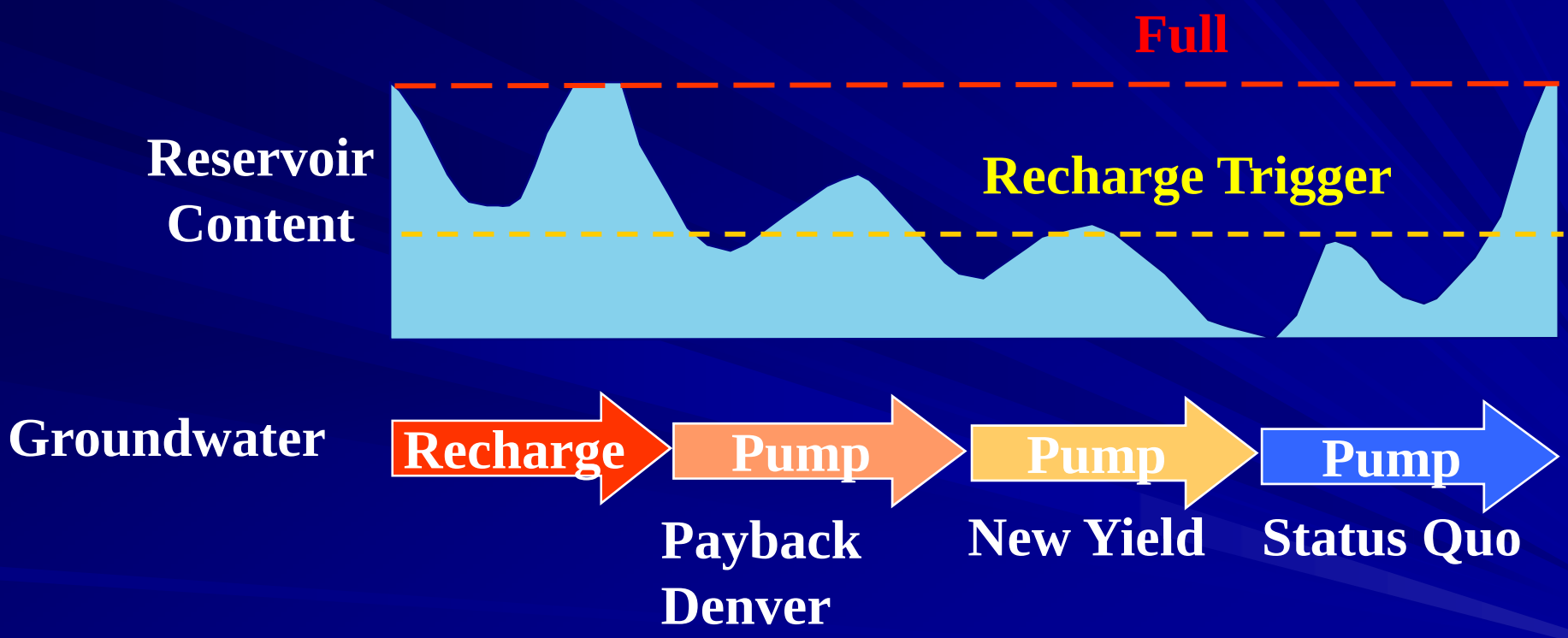
3A. Use Denver Basin Aquifer with Borrowing from Cheesman and Dillon Reservoir (and Payback).

3B. Use Denver Basin Aquifer with Use of Denver Water Facilities to Divert Free-River Water.

Comparison of Alternatives

Alt.	Description	Annual Pumping (acre feet)	Capital Cost (billion $)	Total Cost (billion $)	Comments
1A	Status Quo – Pump non-tributary ground water	45,061	2.31	4.04	Most expensive. Peak demands met through pumping. Twice as many wells needed as in 1B.
1B	Pump non-tributary ground water with storage for peaking	47,962	1.40	2.70	Pump at constant rate year round. Savings from fewer wells greater than cost of storage and treatment.
2	Pump non-tributary with maximum reuse	38,344	1.09	2.25	Reduces groundwater pumping by 20%. Study recommends max reuse w/ any alternative.
3A	Conjunctive use with borrowing from Denver Water storage	20,146	1.65	3.00	Potential yield of 26,000 AF. Mitigation for Denver Water, West Slope and South Platte not included in costs.
3B	Conjunctive use of free river water	25,525	1.42	2.55	Potential yield of 19,000 AF. Mitigation for Denver Water, West Slope and South Platte not included in costs.

Hypothetical Conjunctive Use Borrowing Project – 3A



Study Conclusions on Conjunctive Use

- Operationally feasible.
- Even without borrowing, major reductions in ground water use can be achieved.
- No new on-stream reservoirs needed.
- Recreational levels in Dillon Reservoir can be protected, especially without borrowing.
- Feasibility of large-scale aquifer recharge is unknown.
- Borrowing from Denver Water's reservoirs greatly increases their fluctuation.
- Compensation to Denver Water and West Slope unknown.

Study Conclusions

- Continued reliance on ground water pumping will result in eventual loss of groundwater as economically viable resource.
- Problem is loss of well production resulting from loss in regional head and well-to-well interference.
- Status quo pumping (1A) will result in 85% loss in production in Arapahoe Aquifer by 2050.
- Year-round pumping (1B) lowers required production rate by 60%.
- Additional reuse (2) and conservation reduce rate of water withdrawal and lower costs, and should be pursued with other alternatives.
- 3B does not require borrowing and may be more acceptable.
- Given cross-boundary influences, water providers should consider rules for groundwater management.